ENSO Cycle: Recent Evolution, Current Status and Predictions

Update prepared by
Climate Prediction Center / NCEP
November 15, 2004

Outline

- Overview
- Recent Evolution and Current Conditions
- Oceanic NiZo Index (ONI) – "Revised 1 March 2004"
- Pacific SST Outlook
- U.S. Seasonal Precipitation and Temperature Outlooks
- Summary

Overview

• Persistent warmth in the central equatorial Pacific and recent expansion of this warmth into the eastern equatorial Pacific indicate that warm episode (El Niño) conditions have developed.

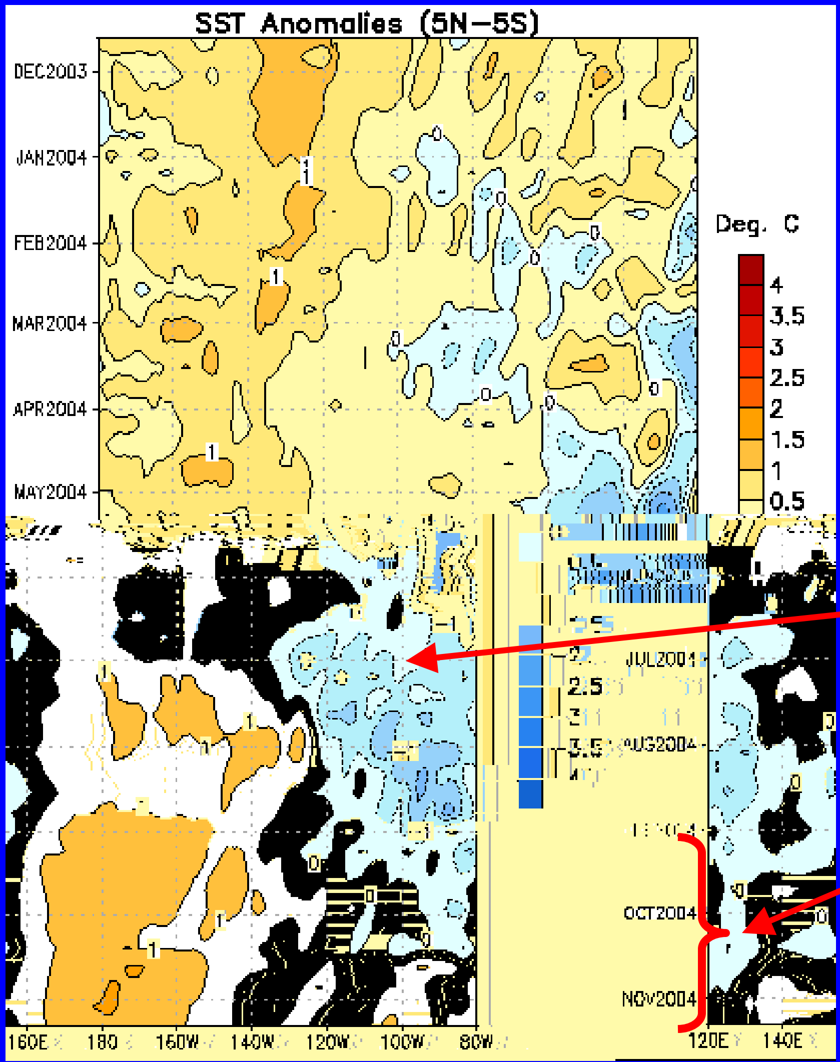
• The most recent value of the ONI is +0.9 (for the period August-October 2004), which satisfies the NOAA operational definition for El Niño. The most recent 5-month running mean value (June-October) of the Southern Oscillation Index (SOI) is –0.6, which is also consistent with the development of warm episode conditions.

• Based on statistical and coupled model forecasts and the recent evolution of oceanic and atmospheric conditions in the tropical Pacific, it seems most likely that SST anomalies in the Niño 3.4 region will remain positive, at or above +0.5°C, through early 2005.

• Expected impacts over the U. S. during this winter (DJF) include: wetter-than-average conditions over Texas, drier-than-average conditions over the Pacific Northwest and the Ohio and Tennessee Valleys, warmer-than-average conditions over most of the West, and over the northern and central Great Plains, and cooler-than-average conditions over the Gulf Coast, Southeast and Mid-Atlantic.

Recent Evolution of Equatorial Pacific SST Departures

Time

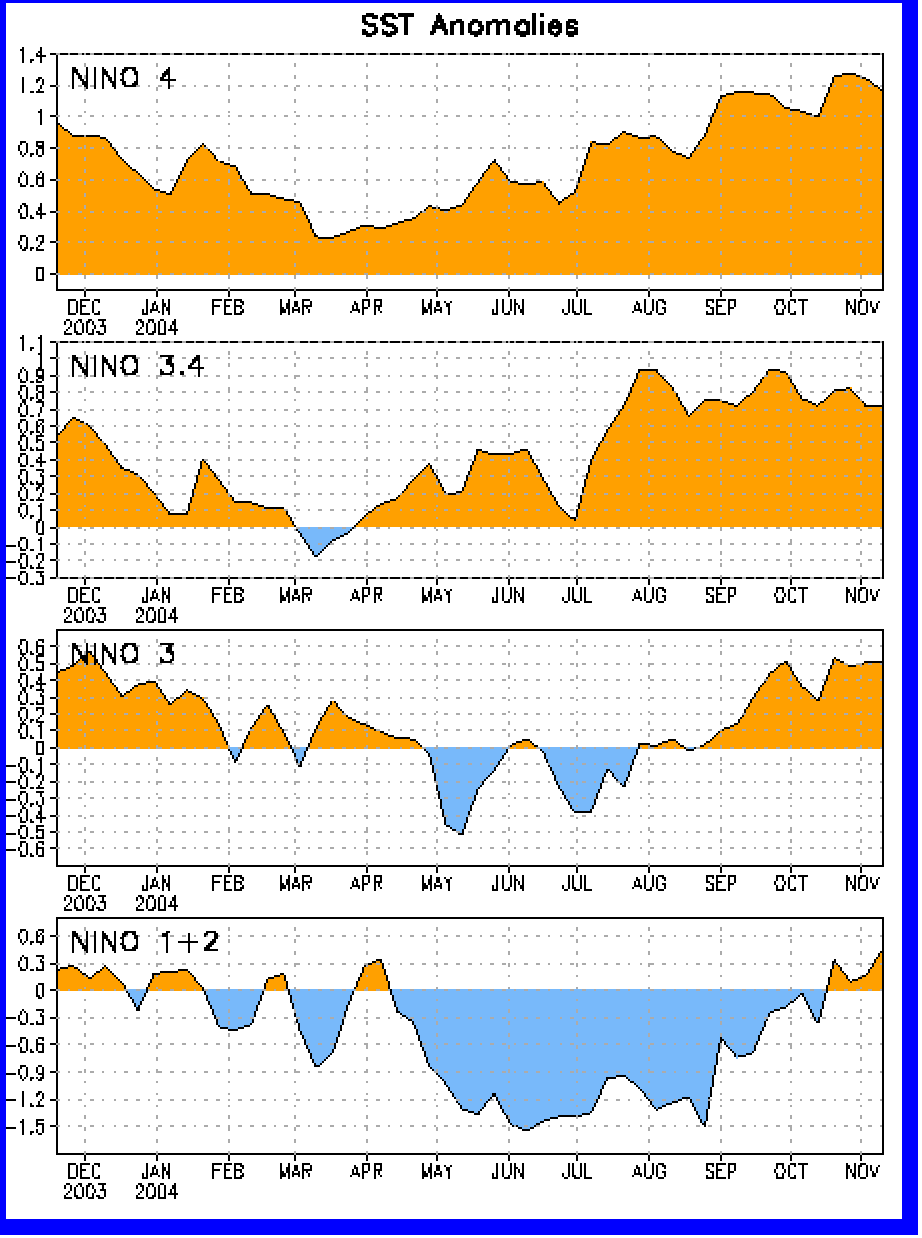


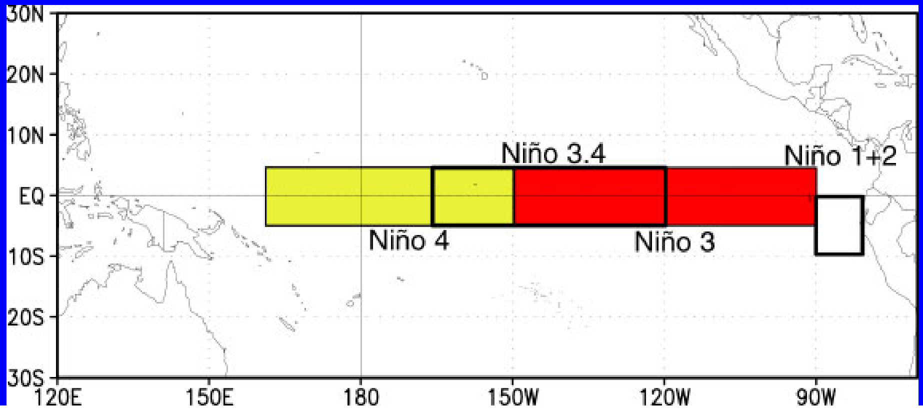
Longitude

- During March-August 2004 SSTs were cooler-than-average in the eastern equatorial Pacific and warmer-than-average in the western and central equatorial Pacific.
- Departures increased substantially in the central equatorial Pacific during July.
- The warmth in the central equatorial Pacific has persisted and expanded eastward in recent months.

Niño Indices: Recent Evolution

SST anomalies greater than or equal to +0.5C are observed in the Niño 4, Niño 3.4 and Niño 3 regions. In recent months negative SST anomalies decreased in magnitude in the Niño 1+2 region, with the most recent weekly SST anomalies being slightly positive. The persistent warmth in the Niño 4 and 3.4 regions and recent expansion of this warmth eastward into the Niño 3 and Niño 1+2 regions indicate the early stages of a warm (El Niño) episode.

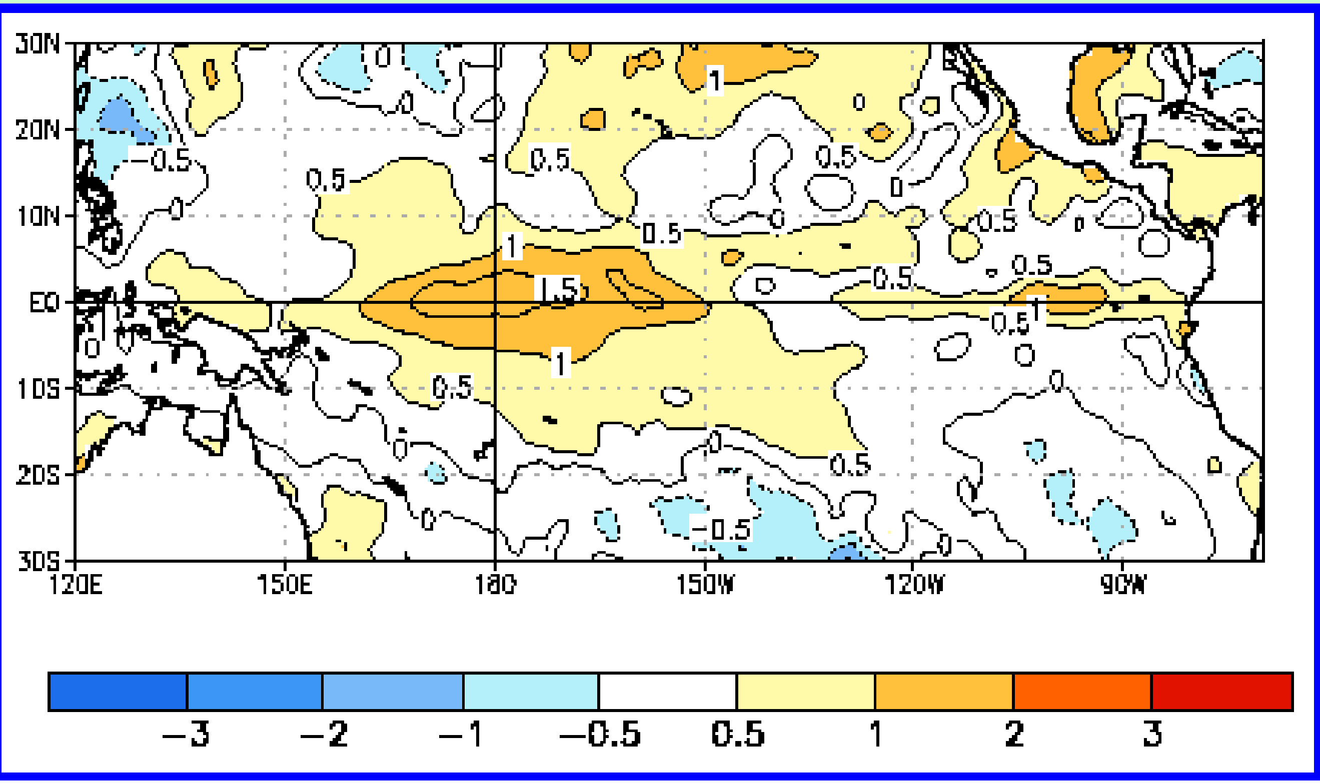




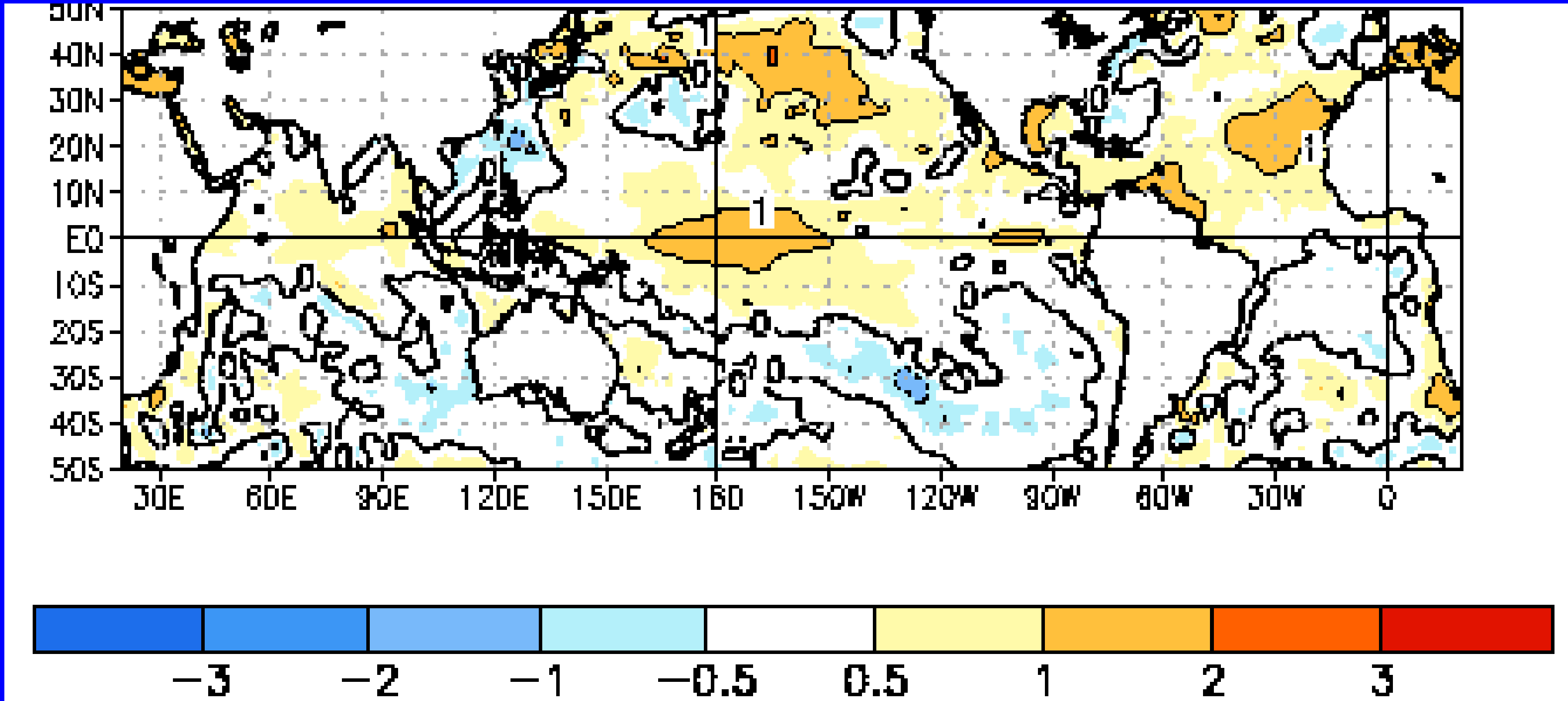
Average SST Departures in the Tropical Pacific: Last 4 Weeks

Equatorial ocean surface temperatures greater than +0.5°C (~1°F) above average are found at most locations between 130°E and the South American coast. Departures greater than +1°C are found between 160°E and 150°W, and between 105°W and 90°W.

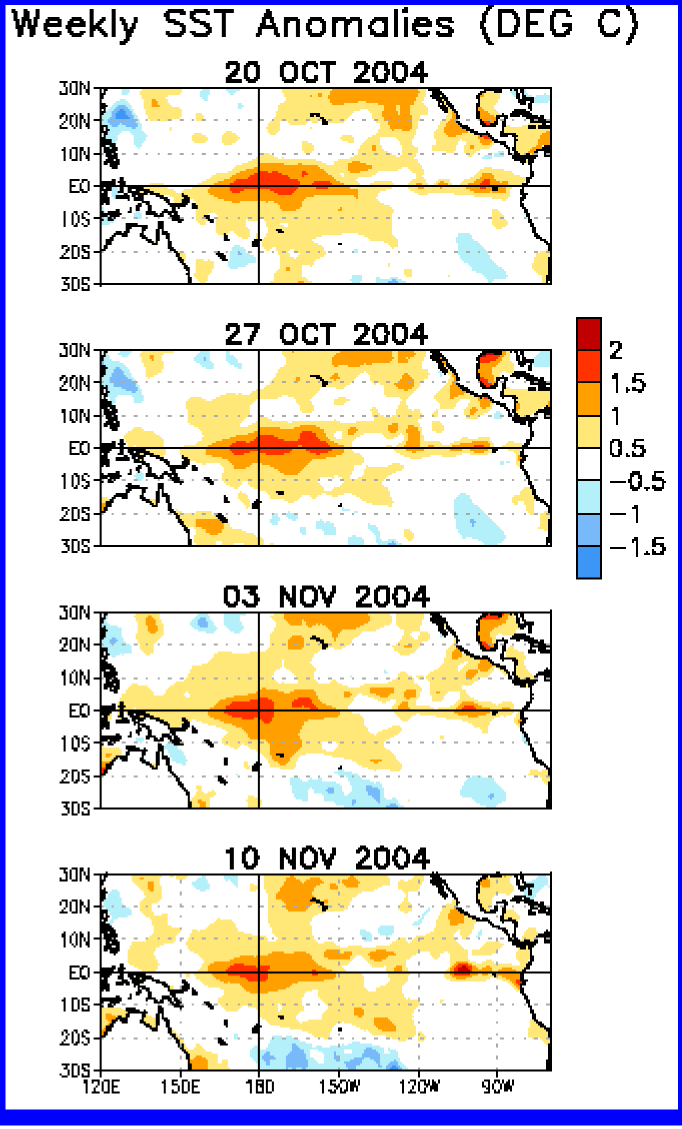
17 October-13 November 2004



Global SST Departures: 10 Oct.-6 Nov. 2004

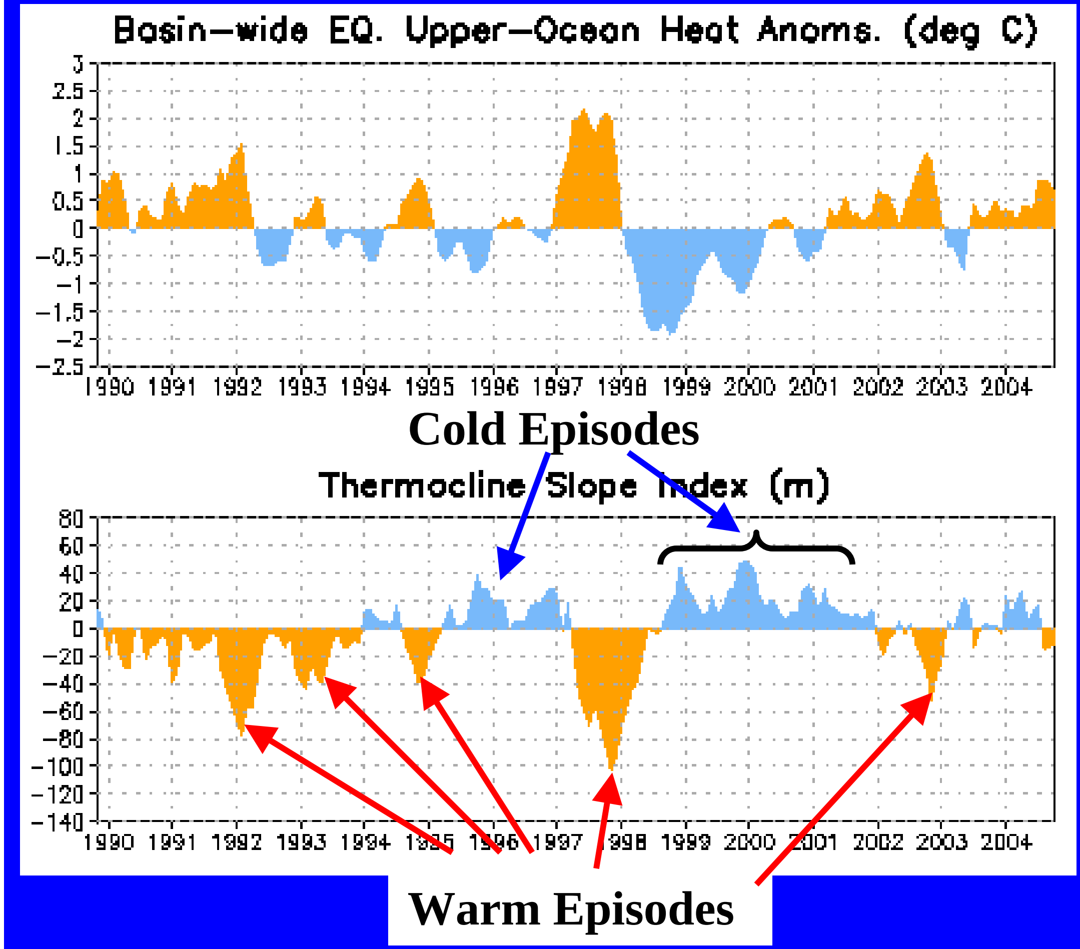


Evolution of SST Departure Patterns in the Last 4 Weeks



During late October through early November 2004 positive SST anomalies persisted throughout most of the equatorial Pacific. Anomalies greater than +1°C were observed in the central equatorial Pacific and in portions of the eastern equatorial Pacific. The recent evolution indicates the early stages of a warm (El Niño**)** episode.

Upper-Ocean Conditions in the Eq. Pacific



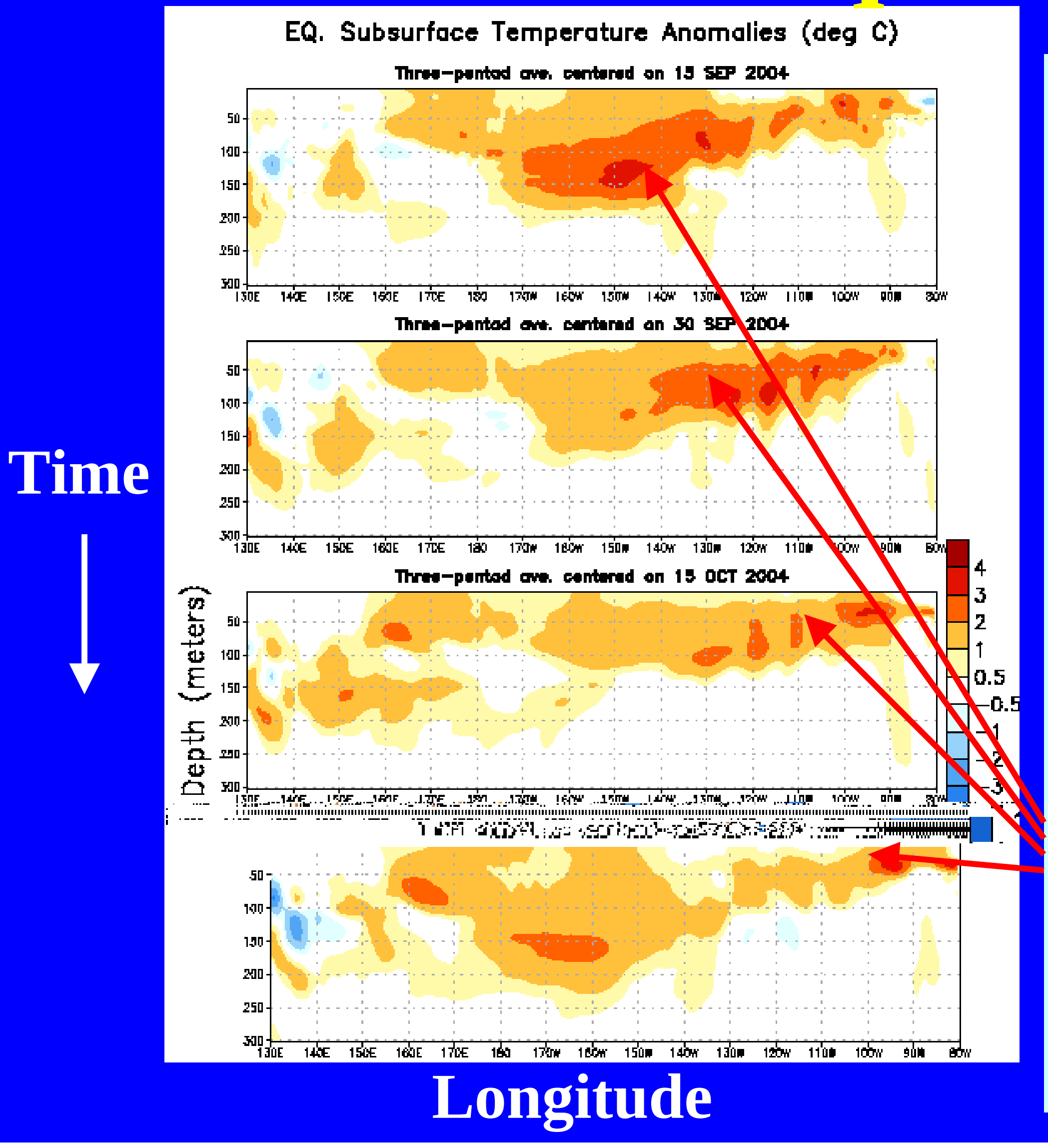
• The basin-wide equatorial upper ocean heat content is greatest prior to and during the early stages of a warm (El Niño) episode.

• The upper ocean heat content is least prior to and during the early stages of a cold (La Niña) episode.

• The slope of the oceanic thermocline is least (greatest) during warm (cold) episodes.

• Note that the most recent values of anomalous upper ocean heat content and thermocline slope are less in magnitude than those observed in the stronger warm episodes (e.g., 1991-92 and 1997-98).

Subsurface Conditions in the Eq. Pacific



• During September-October 2004 the basin-wide upper-ocean heat content was greater than average throughout the equatorial Pacific, which is a feature usually observed prior to and during the early stages of warm (El Niño) episodes.

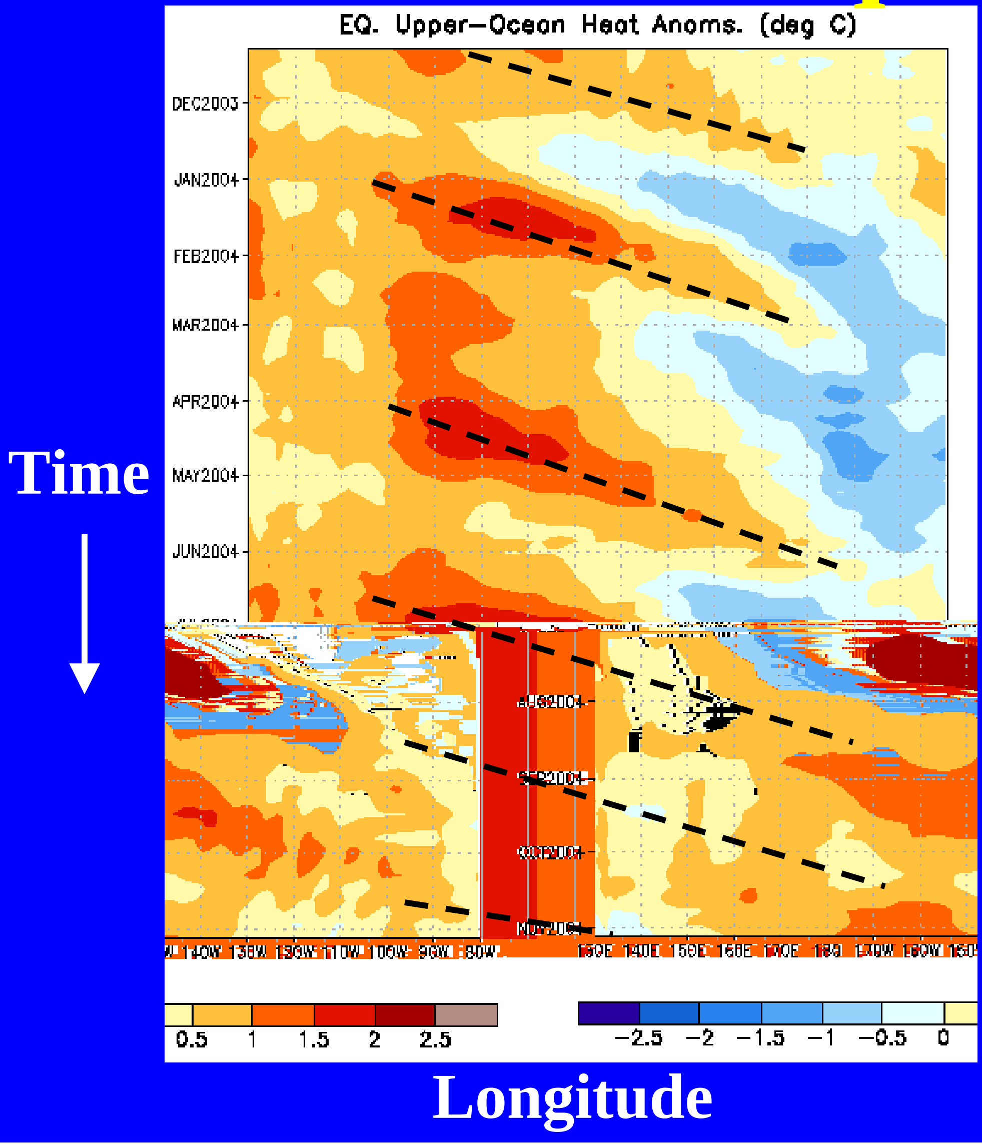
• There has been considerable intraseasonal variability in the subsurface temperature anomalies, resulting from eastward-propagating oceanic Kelvin waves.

• The eastward shift of the maximum in subsurface temperature anomalies during September-October was associated with a Kelvin wave initiated during August.

MJO Intraseasonal Variability

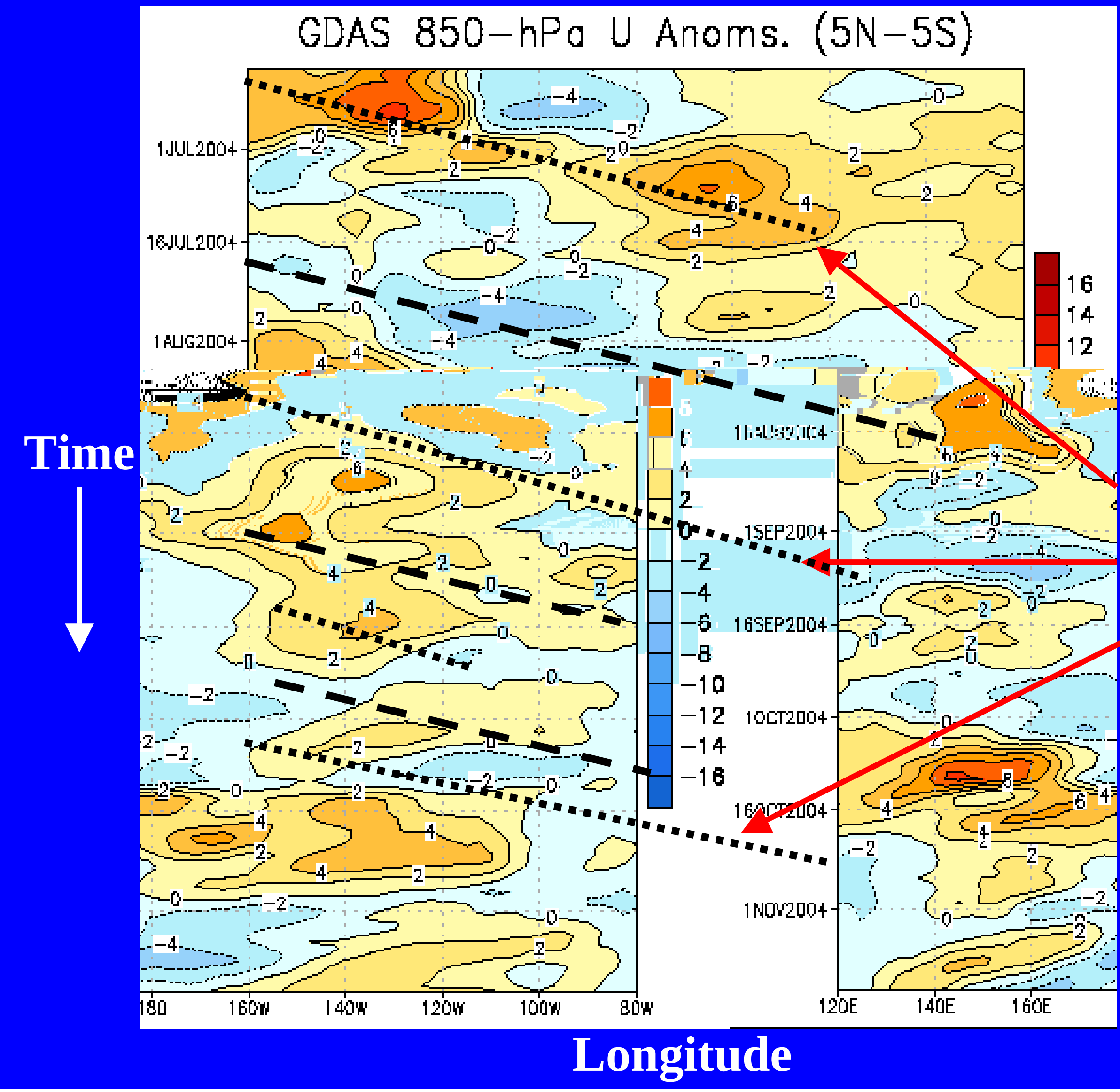
- **MJO activity in recent months has resulted in significant variability in the atmosphere (wind and pressure) and Pacific Ocean (surface and subsurface temperature).**
- **Related to this activity**
  - **significant weakening of the low-level easterly winds occurred over the equatorial Pacific during late June-early July, late August-early September, and again in October.**
  - **Each of these events initiated eastward-propagating oceanic Kelvin waves.**

Heat Content Evolution in the Eq. Pacific



- Since late 2003 there have been several cases of eastward-propagating oceanic Kelvin waves (indicated by dashed black lines in the figure).
- Each Kelvin wave was initiated when the easterlies weakened over the equatorial Pacific in association with Madden-Julian Oscillation (MJO) activity.

Low-level (850-hPa) Zonal (east-west) Wind Anomalies

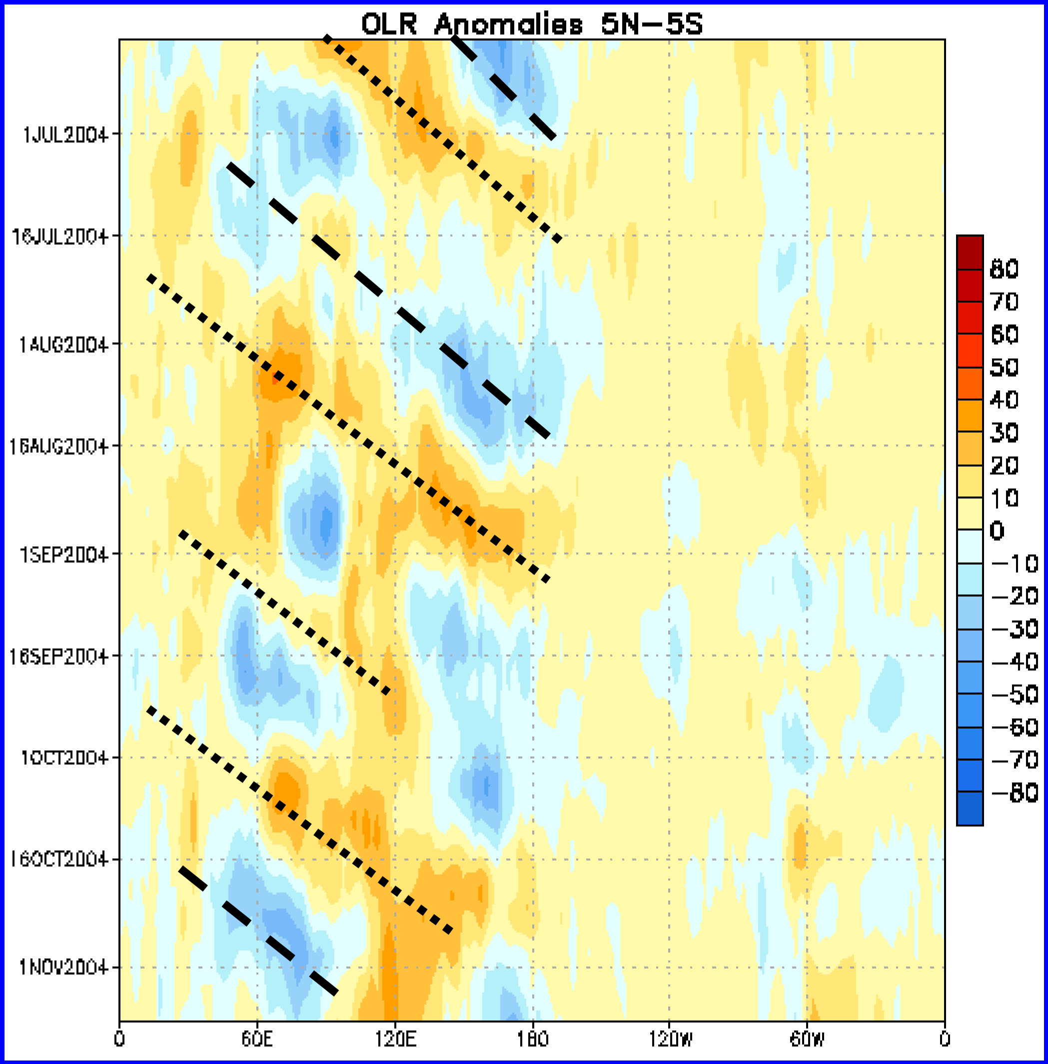


Weaker-than-average easterlies (orange/red shading).

Stronger-than-average easterlies (blue shading).

During early July, late August and October the easterlies weakened substantially throughout the equatorial Pacific.

Outgoing Longwave Radiation (OLR) Anomalies



Time

Longitude

Drier-than-average conditions (orange/red shading)

Wetter-than-average conditions (blue shading)

During October, drier-than-average conditions spread from the Indian Ocean into the western equatorial Pacific.

Persistent drier-than-average conditions have been observed in the region of Indonesia (near 120E) since mid-August.

Oceanic Niño Index (ONI)

- **Based on the principal measure for monitoring, assessment, and prediction of ENSO (SST departures from average in the Niño 3.4 region)**
- **Three-month running-mean values of SST departures from average in the Niño 3.4 region, based on a set of improved homogeneous historical SST analyses (Extended Reconstructed SST – ERSST.v2). The methodology is described in Smith and Reynolds, 2003, *J. Climate*, 16, 1495-1510.**
- **Used to place current conditions in historical perspective**
- **NOAA operational definitions of El Niño and La Niña are keyed to the index.**

NOAA Operational Definitions for El Niño and La Niña

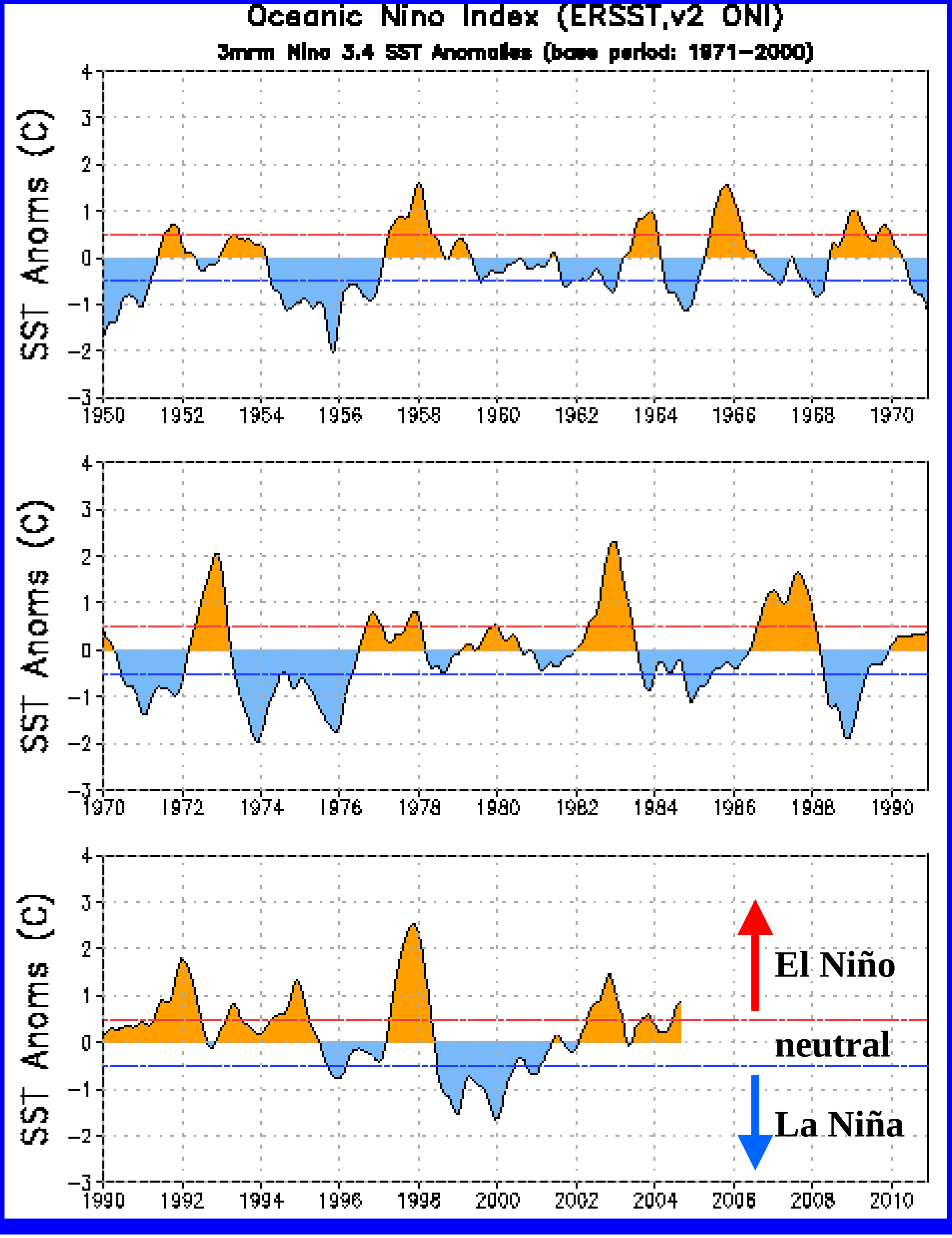
El Niño: **characterized by a *positive* ONI greater than or equal to +0.5°C.**

La NiZa: **characterized by a *negative* ONI less than or equal to !0.5°C.**

To be classified as a full-fledged El Niño or La Niña episode these thresholds must be exceeded for a period of at least 5 consecutive months.

ONI: Evolution since 1950

The most recent ONI value (+0.9C for August-October 2004) exceeds the threshold (+0.5C) for El Niño conditions.



Historical El Niño and La Niña episodes, based on the ONI computed using ERSST.v2

Warm Episodes	max	Cold Episodes	min
JAS 1951 - NDJ 1951/52	0.7	ASO 1949 – FMA 1951	-1.8
MAM 1957 – MJJ 1958	1.6	MAM 1954 – DJF 1956/57	-2.1
JJA 1963 – DJF 1963/64	1.0	ASO 1961 – MAM 1962	-0.6
MJJ 1965 – MAM 1966	1.6	MAM 1964 – JFM 1965	-1.1
OND 1968 – AMJ 1969	1.0	SON 1967 – MAM 1968	-0.9
ASO 1969 – DJF 1969/70	0.7	JJA 1970 – DJF 1971/72	-1.4
AMJ 1972 – FMA 1973	2.1	AMJ 1973 – JJA 1974	-2.0
ASO 1976 – JFM 1977	0.8	ASO 1974 – AMJ 1976	-1.8
ASO 1977 - DJF 1977/78	0.8	ASO 1983 – DJF 1983/84	-0.9
AMJ 1982 – MJJ 1983	2.3	SON 1984 – MJJ 1985	-1.1
JAS 1986 – JFM 1988	1.6	AMJ 1988 – AMJ 1989	-1.9
AMJ 1991 – MJJ 1992	1.8	ASO 1995 – FMA 1996	-0.8
FMA 1993 – JJA 1993	0.8	JJA 1998 – MJJ 2000	-1.6
MAM 1994 – FMA 1995	1.3	SON 2000 – JFM 2001	-0.7
AMJ 1997 – MAM 1998	2.5		
AMJ 2002 – FMA 2003	1.5		

Warm (red) and cold (blue) episodes based on a threshold of +/- 0.5 C for the Oceanic Nino Index (ONI) [3 month running mean of ERSST.v2 SST anomalies in the Nino 3.4 region (5N-5S, 120-170W)], based on the 1971-2000 base period. For historical purposes cold and warm episodes (blue and red colored numbers) are defined when the threshold is met for a minimum of 5 consecutive over-lapping seasons.

Year	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ
1950	**-1.8**	**-1.5**	**-1.4**	**-1.4**	**-1.4**	**-1.2**	**-0.9**	**-0.8**	**-0.8**	**-0.8**	**-0.9**	**-1.0**
1951	**-1.0**	**-0.8**	**-0.6**	-0.4	-0.2	0.1	0.4	**0.5**	**0.6**	**0.7**	**0.7**	**0.6**
1952	0.3	0.1	0.1	0.1	0.0	-0.2	-0.3	-0.3	-0.1	-0.2	-0.2	-0.1
1953	0.1	0.3	0.4	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.3
1954	0.3	0.2	-0.1	**-0.5**	**-0.7**	**-0.7**	**-0.8**	**-1.0**	**-1.1**	**-1.1**	**-1.0**	**-1.0**
1955	**-1.0**	**-0.9**	**-0.9**	**-1.0**	**-1.1**	**-1.0**	**-1.0**	**-1.0**	**-1.5**	**-1.8**	**-2.1**	**-1.7**
1956	**-1.2**	**-0.8**	**-0.7**	**-0.6**	**-0.6**	**-0.6**	**-0.7**	**-0.8**	**-0.9**	**-0.9**	**-0.9**	**-0.8**
1957	**-0.5**	-0.1	0.2	**0.6**	**0.7**	**0.8**	**0.9**	**0.9**	**0.8**	**0.9**	**1.2**	**1.5**
1958	**1.6**	**1.5**	**1.1**	**0.7**	**0.5**	**0.5**	0.4	0.1	0.0	0.0	0.1	0.3
1959	0.4	0.4	0.3	0.2	0.0	-0.3	-0.4	-0.5	-0.4	-0.4	-0.3	-0.3
1960	-0.3	-0.3	-0.3	-0.2	-0.1	-0.1	0.0	0.0	-0.1	-0.2	-0.3	-0.2
1961	-0.2	-0.2	-0.2	-0.1	0.1	0.1	0.0	-0.3	**-0.6**	**-0.6**	**-0.5**	**-0.5**
1962	**-0.5**	**-0.5**	**-0.5**	**-0.5**	-0.4	-0.3	-0.2	-0.3	-0.4	-0.6	-0.7	-0.7
1963	-0.6	-0.3	0.0	0.1	0.1	0.3	**0.6**	**0.8**	**0.8**	**0.9**	**1.0**	**1.0**
1964	**0.8**	0.4	-0.1	**-0.5**	**-0.7**	**-0.7**	**-0.8**	**-0.9**	**-1.0**	**-1.1**	**-1.1**	**-1.0**
1965	**-0.8**	**-0.5**	-0.3	0.0	0.2	**0.6**	**1.0**	**1.2**	**1.4**	**1.5**	**1.6**	**1.5**
1966	**1.2**	**1.1**	**0.8**	**0.5**	0.2	0.1	0.1	0.0	-0.2	-0.3	-0.3	-0.4
1967	-0.4	-0.5	-0.6	-0.5	-0.3	0.0	0.0	-0.2	-0.4	**-0.5**	**-0.5**	**-0.6**
1968	**-0.7**	**-0.9**	**-0.8**	**-0.8**	-0.4	0.0	0.3	0.3	0.2	0.4	**0.6**	**0.9**
1969	**1.0**	**1.0**	**0.9**	**0.7**	**0.6**	0.4	0.4	0.4	**0.6**	**0.7**	**0.7**	**0.6**
1970	**0.5**	0.3	0.2	0.1	-0.1	-0.4	**-0.6**	**-0.8**	**-0.8**	**-0.8**	**-0.9**	**-1.2**
1971	**-1.4**	**-1.4**	**-1.2**	**-1.0**	**-0.8**	**-0.8**	**-0.8**	**-0.8**	**-0.9**	**-0.9**	**-1.0**	**-0.9**
1972	**-0.7**	-0.3	0.0	0.3	**0.5**	**0.8**	**1.1**	**1.3**	**1.5**	**1.8**	**2.0**	**2.1**
1973	**1.8**	**1.2**	**0.5**	-0.1	**-0.5**	**-0.8**	**-1.1**	**-1.3**	**-1.4**	**-1.7**	**-1.9**	**-2.0**
1974	**-1.8**	**-1.6**	**-1.2**	**-1.1**	**-0.9**	**-0.7**	**-0.5**	-0.4	**-0.5**	**-0.7**	**-0.8**	**-0.7**
1975	**-0.6**	**-0.6**	**-0.7**	**-0.8**	**-1.0**	**-1.1**	**-1.3**	**-1.4**	**-1.6**	**-1.6**	**-1.7**	**-1.8**

Warm (red) and cold (blue) episodes based on a threshold of +/- 0.5 C for the Oceanic Nino Index (ONI) [3 month running mean of ERSST.v2 SST anomalies in the Nino 3.4 region (5N-5S, 120-170W)], based on the 1971-2000 base period. For historical purposes cold and warm episodes (blue and red colored numbers) are defined when the threshold is met for a minimum of 5 consecutive over-lapping seasons.

Year	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ
1976	**-1.6**	**-1.2**	**-0.9**	**-0.7**	**-0.5**	-0.2	0.1	0.3	**0.5**	**0.7**	**0.8**	**0.8**
1977	**0.6**	**0.5**	0.2	0.1	0.2	0.3	0.3	0.4	**0.5**	**0.7**	**0.8**	**0.8**
1978	**0.7**	0.4	0.0	-0.3	-0.4	-0.3	-0.4	-0.5	-0.5	-0.4	-0.2	-0.1
1979	-0.1	0.0	0.1	0.2	0.1	0.0	0.0	0.2	0.3	0.4	0.5	0.5
1980	0.5	0.3	0.2	0.2	0.3	0.3	0.2	0.0	-0.1	0.0	0.0	-0.1
1981	-0.3	-0.4	-0.4	-0.3	-0.3	-0.3	-0.4	-0.3	-0.2	-0.1	-0.1	-0.1
1982	0.0	0.1	0.2	0.4	**0.6**	**0.7**	**0.8**	**1.0**	**1.5**	**1.9**	**2.2**	**2.3**
1983	**2.3**	**2.0**	**1.6**	**1.2**	**1.0**	**0.6**	0.2	-0.2	**-0.5**	**-0.8**	**-0.9**	**-0.8**
1984	**-0.5**	-0.3	-0.2	-0.4	-0.5	-0.5	-0.3	-0.2	-0.3	**-0.6**	**-1.0**	**-1.1**
1985	**-1.0**	**-0.8**	**-0.8**	**-0.8**	**-0.7**	**-0.5**	-0.4	-0.4	-0.4	-0.3	-0.2	-0.3
1986	-0.4	-0.4	-0.3	-0.2	-0.1	0.0	0.2	**0.5**	**0.7**	**0.9**	**1.1**	**1.2**
1987	**1.3**	**1.2**	**1.1**	**1.0**	**1.0**	**1.2**	**1.5**	**1.6**	**1.6**	**1.5**	**1.3**	**1.1**
1988	**0.8**	**0.5**	0.1	-0.3	**-0.8**	**-1.2**	**-1.2**	**-1.1**	**-1.3**	**-1.6**	**-1.9**	**-1.9**
1989	**-1.7**	**-1.5**	**-1.1**	**-0.9**	**-0.6**	-0.4	-0.3	-0.3	-0.3	-0.3	-0.2	-0.1
1990	0.1	0.2	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.4
1991	0.5	0.4	0.4	0.4	**0.6**	**0.8**	**0.9**	**0.9**	**0.8**	**1.0**	**1.4**	**1.7**
1992	**1.8**	**1.7**	**1.6**	**1.4**	**1.1**	**0.8**	0.4	0.2	-0.1	-0.1	0.0	0.1
1993	0.3	0.4	**0.6**	**0.8**	**0.8**	**0.7**	**0.5**	0.4	0.4	0.3	0.2	0.2
1994	0.2	0.3	0.4	**0.5**	**0.6**	**0.6**	**0.6**	**0.6**	**0.7**	**0.9**	**1.2**	**1.3**
1995	**1.2**	**0.9**	**0.7**	0.4	0.2	0.1	0.0	-0.3	**-0.5**	**-0.6**	**-0.7**	**-0.8**
1996	**-0.8**	**-0.7**	**-0.5**	-0.3	-0.2	-0.2	-0.1	-0.2	-0.2	-0.2	-0.3	-0.4
1997	-0.4	-0.3	0.0	0.4	**0.9**	**1.4**	**1.7**	**2.0**	**2.3**	**2.4**	**2.5**	**2.5**
1998	**2.4**	**2.0**	**1.4**	**1.1**	0.4	-0.1	**-0.8**	**-1.0**	**-1.1**	**-1.1**	**-1.3**	**-1.5**
1999	**-1.6**	**-1.2**	**-0.9**	**-0.7**	**-0.8**	**-0.8**	**-0.9**	**-0.9**	**-1.0**	**-1.2**	**-1.4**	**-1.6**
2000	**-1.6**	**-1.5**	**-1.1**	**-0.9**	**-0.7**	**-0.6**	-0.4	-0.3	-0.4	**-0.5**	**-0.7**	**-0.7**
2001	**-0.7**	**-0.5**	-0.4	-0.2	-0.1	0.1	0.2	0.1	0.0	-0.1	-0.2	-0.2

Warm (red) and cold (blue) episodes based on a threshold of +/- 0.5 C for the Oceanic Nino Index (ONI) [3 month running mean of ERSST.v2 SST anomalies in the Nino 3.4 region (5N-5S, 120-170W)], based on the 1971-2000 base period. For historical purposes cold and warm episodes (blue and red colored numbers) are defined when the threshold is met for a minimum of 5 consecutive over-lapping seasons.

Year	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ
2002	-0.1	0.1	0.3	0.4	**0.7**	**0.8**	**0.9**	**0.9**	**1.1**	**1.3**	**1.5**	**1.3**
2003	**1.1**	**0.8**	**0.6**	0.1	-0.1	0.0	0.3	0.4	0.5	0.5	0.6	0.5
2004	0.4	0.2	0.2	0.2	0.3	0.4	0.7	0.8	0.9			
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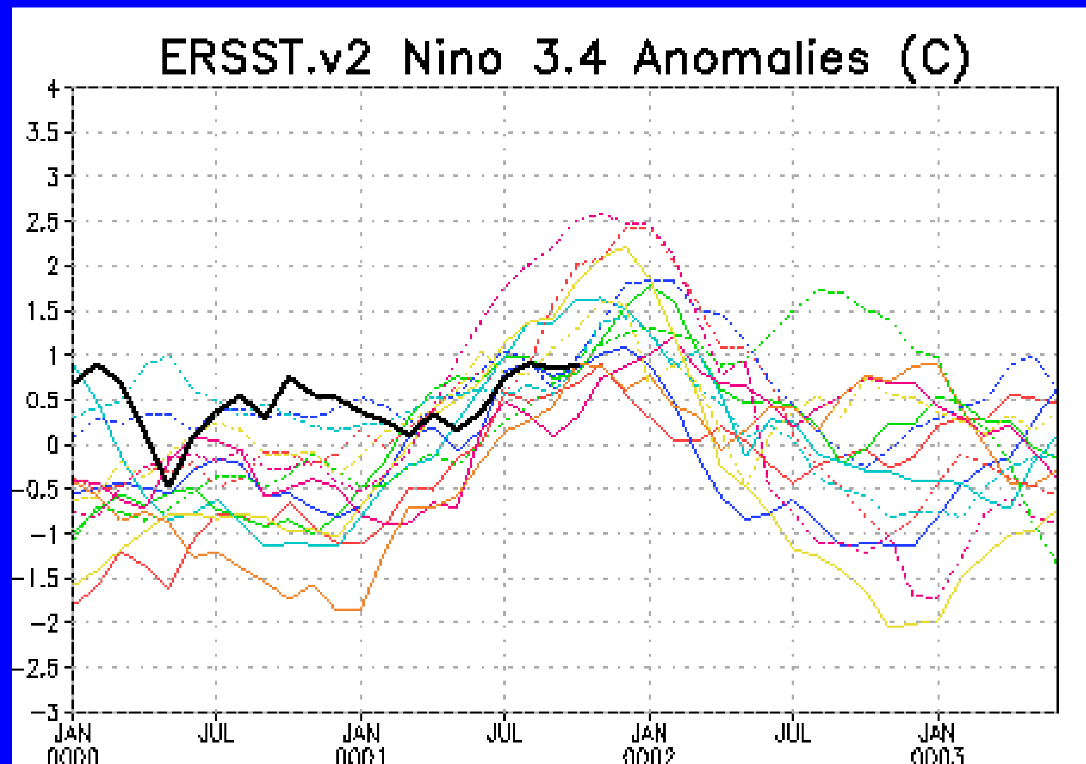
Niño 3.4 evolution – El Niño episodes

1951–1952	1982–1983 (dashed)
1957–1958	1986–1988 (dashed)
1963–1964	1991–1992 (dashed)
1965–1966	1994–1995 (dashed)
1968–1969	1997–1998 (dashed)
1972–1973	2002–2003 (dashed)
1976–1977	2004–2005

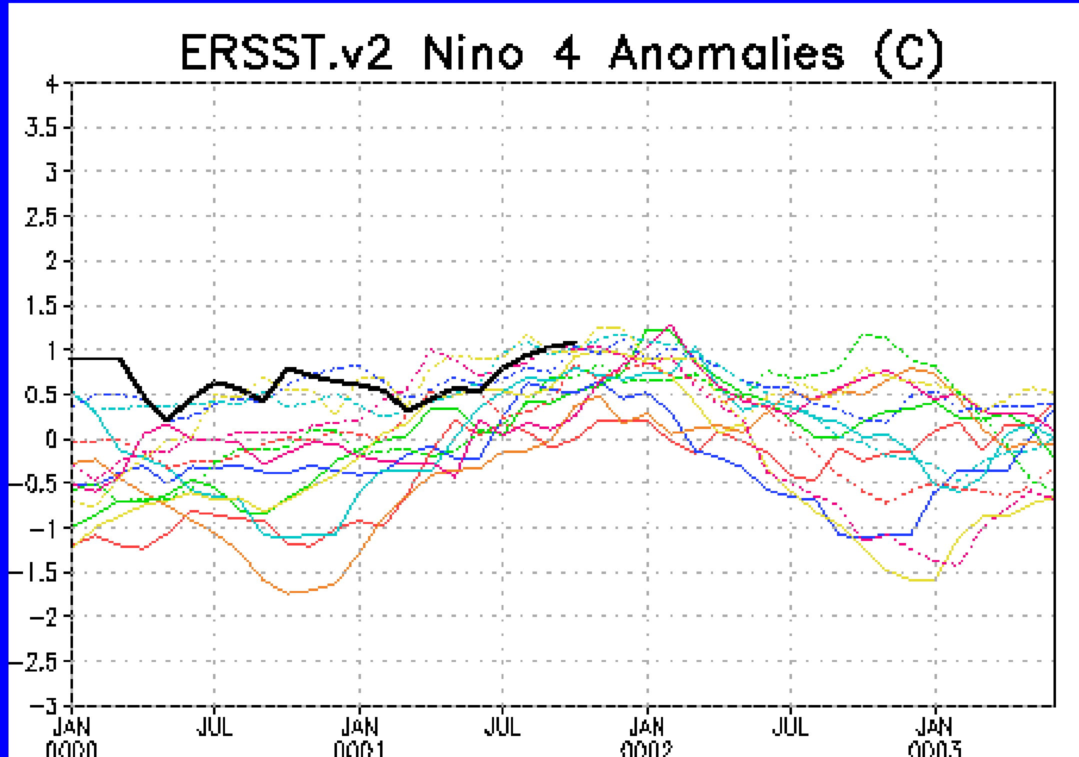


Recent Niño 3.4 values, derived from ERSST.v2, lie in the middle of the distribution of historical El Niño episodes since 1950.

Most recent Niño 3.4 values (heavy black line) compared to values for 13 historical El Niño episodes. On the time axis year 0001 is the first year of a warm episode.

Niño 4 evolution – El Niño episodes

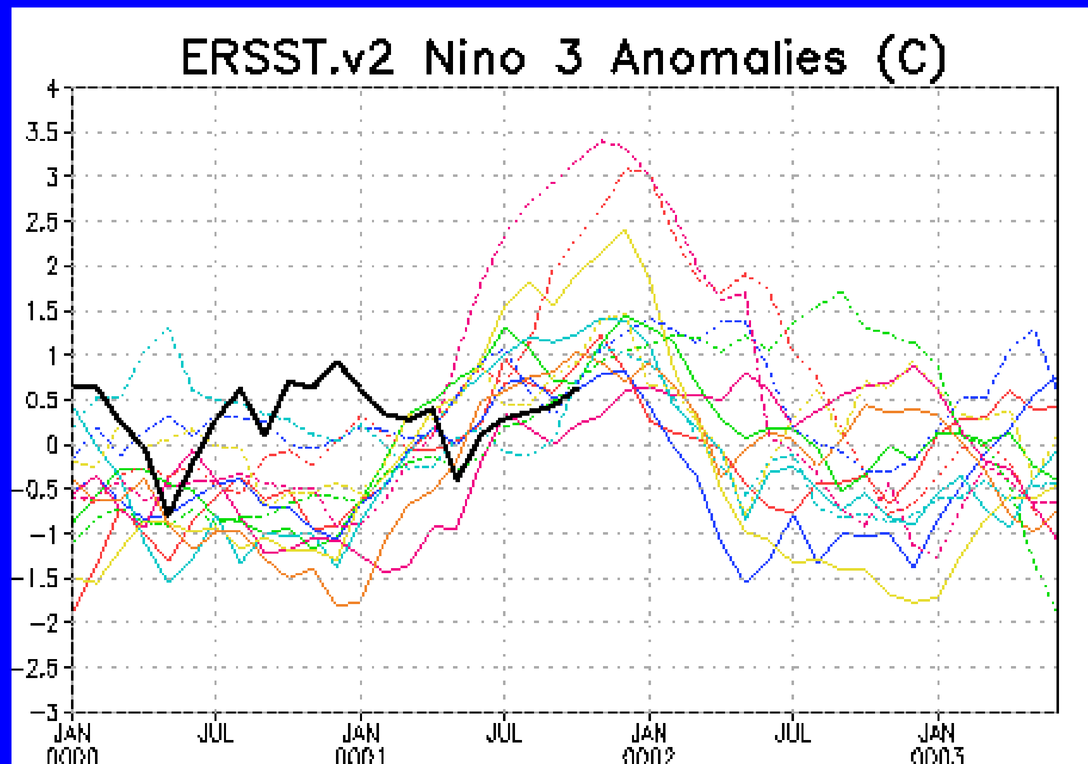
1951–1952	1982–1983 (dashed)
1957–1958	1986–1988 (dashed)
1963–1964	1991–1992 (dashed)
1965–1966	1994–1995 (dashed)
1968–1969	1997–1998 (dashed)
1972–1973	2002–2003 (dashed)
1976–1977	2004–2005



Recent Niño 4 values, derived from ERSST.v2, lie near the top of the distribution of historical El Niño episodes since 1950.

Most recent Niño 4 values (heavy black line) compared to values for 13 historical El Niño episodes. On the time axis year 0001 is the first year of a warm episode.

Niño 3 evolution – El Niño episodes

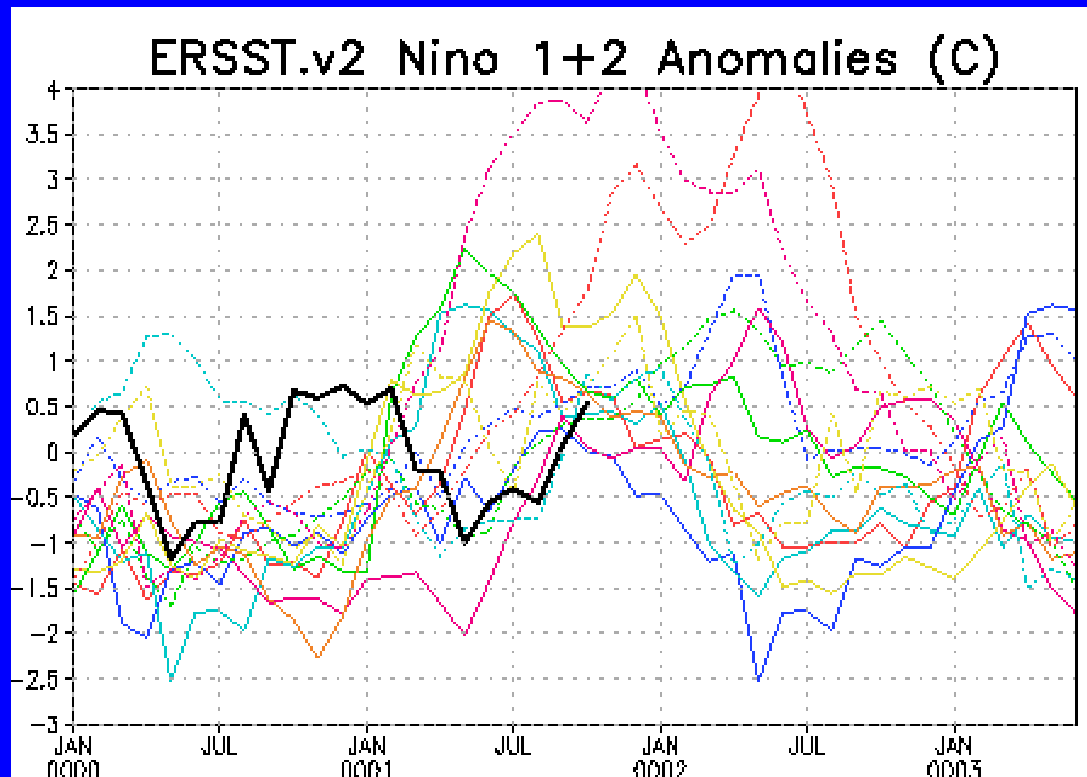


Recent Niño 3 values, derived from ERSST.v2, lie near the bottom of the distribution of historical El Niño episodes since 1950.

Most recent Niño 3 values (heavy black line) compared to values for 13 historical El Niño episodes. On the time axis year 0001 is the first year of a warm episode.

Niño 1+2 evolution – El Niño episodes

1951–1952	1982–1983 (dashed)
1957–1958	1986–1988 (dashed)
1963–1964	1991–1992 (dashed)
1965–1966	1994–1995 (dashed)
1968–1969	1997–1998 (dashed)
1972–1973	2002–2003 (dashed)
1976–1977	2004–2005



Recent Niño 1+2 values, derived from ERSST.v2, lie near the bottom of the distribution of historical El Niño episodes since 1950.

Most recent Niño 1+2 values (heavy black line) compared to values for 13 historical El Niño episodes. On the time axis year 0001 is the first year of a warm episode.

Pacific Niño 3.4 SST Outlook

- Statistical and coupled model forecasts range from neutral conditions to moderate El Niño conditions during the last half of 2004 and early 2005. About 80% of the forecasts indicate that El Niño conditions will continue through early 2005.

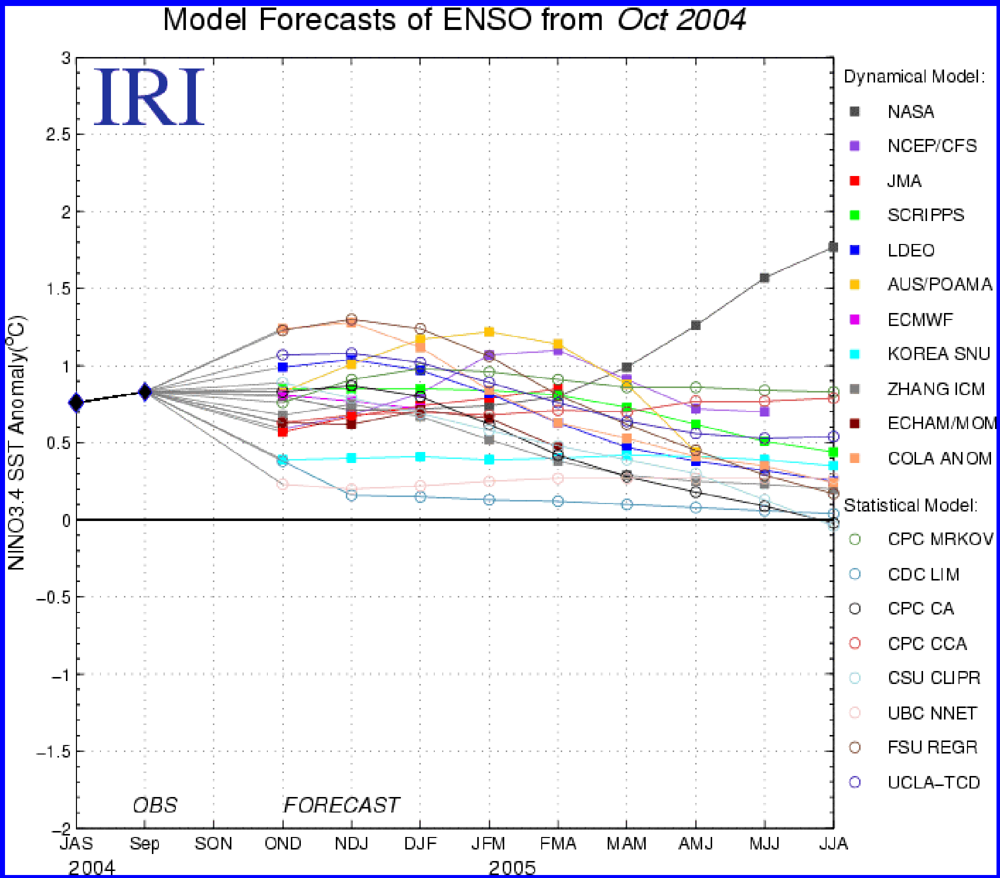
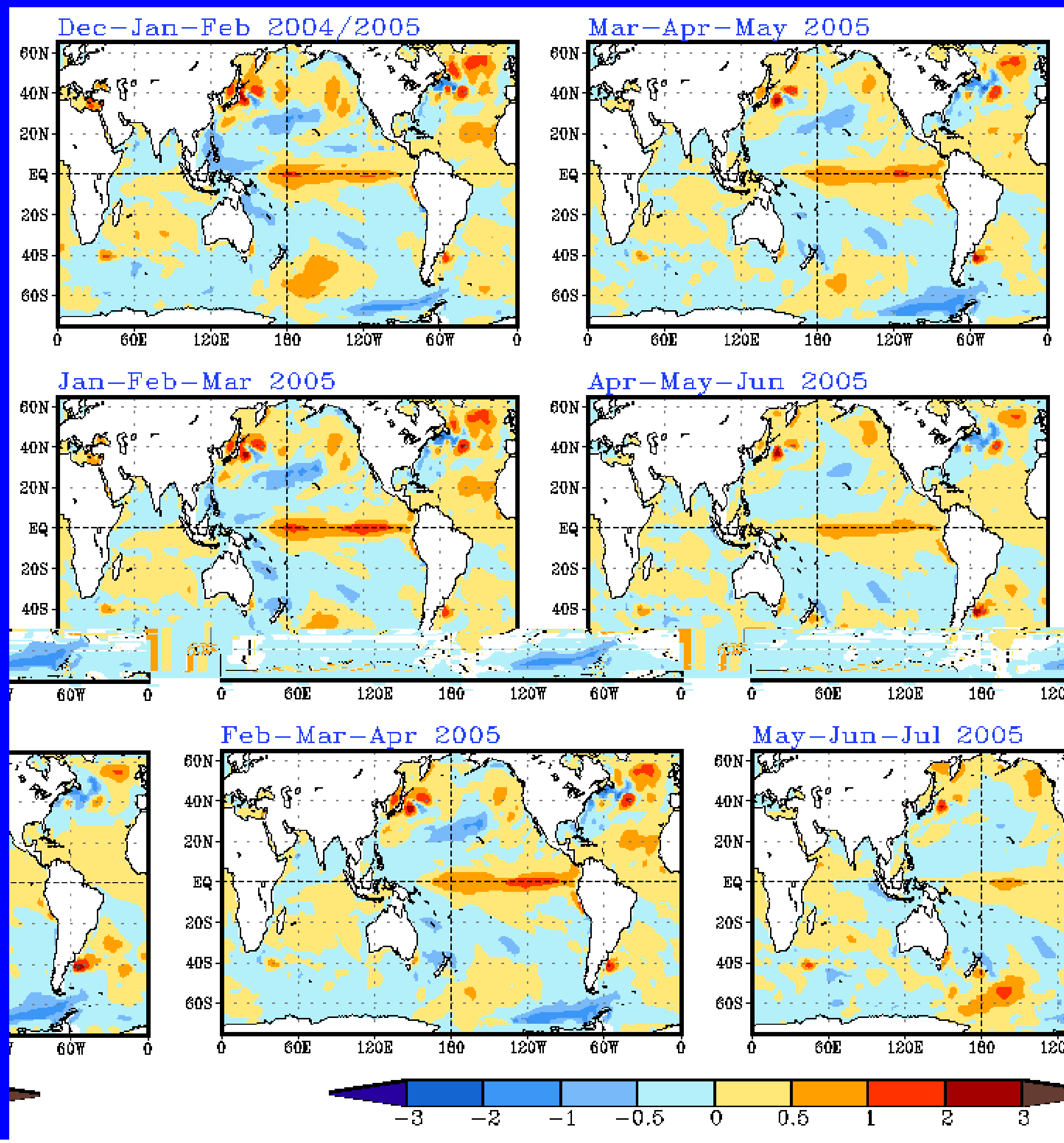


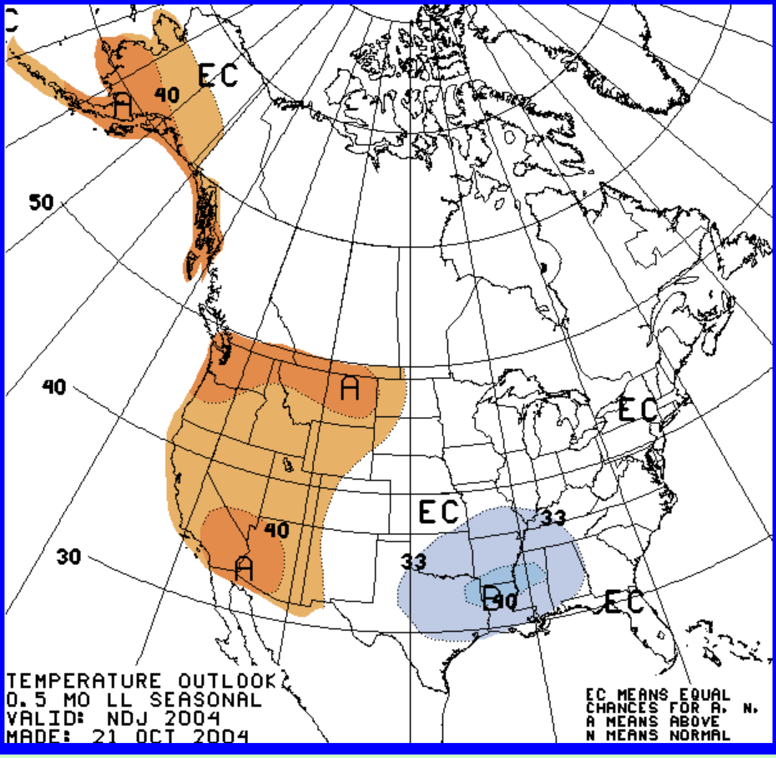
Figure provided by the International Research Institute (IRI) for Climate Prediction (updated 20 October 2004).

SST Outlook: NCEP CFS
13 Nov. 2004

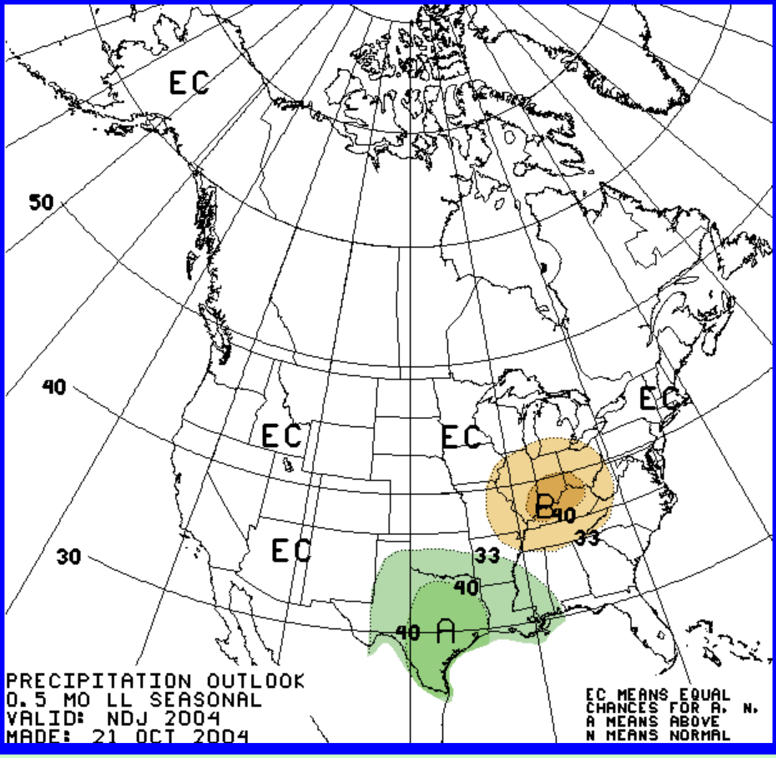


U. S. Seasonal Outlooks November 2004-January 2005

Temperature



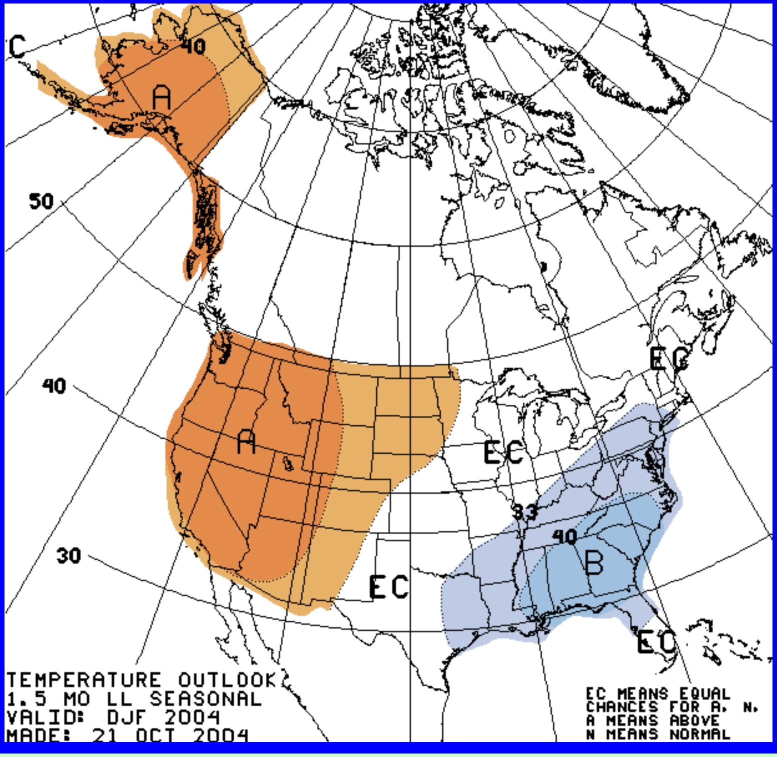
Precipitation



Outlooks combine long-term trends and soil-moisture effects, with typical ENSO cycle impacts, when appropriate.

U. S. Seasonal Outlooks December 2004-February 2005

Temperature



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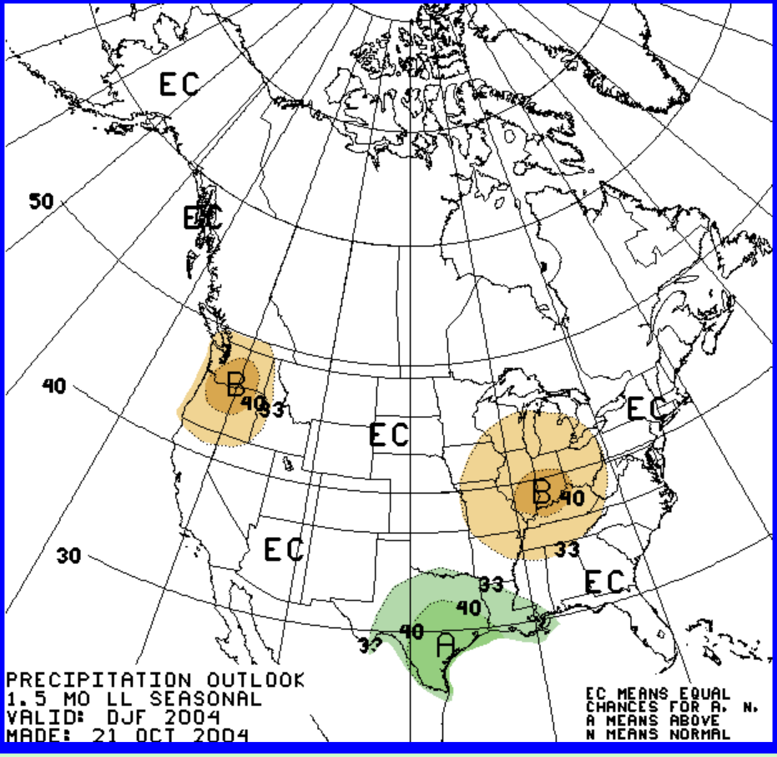
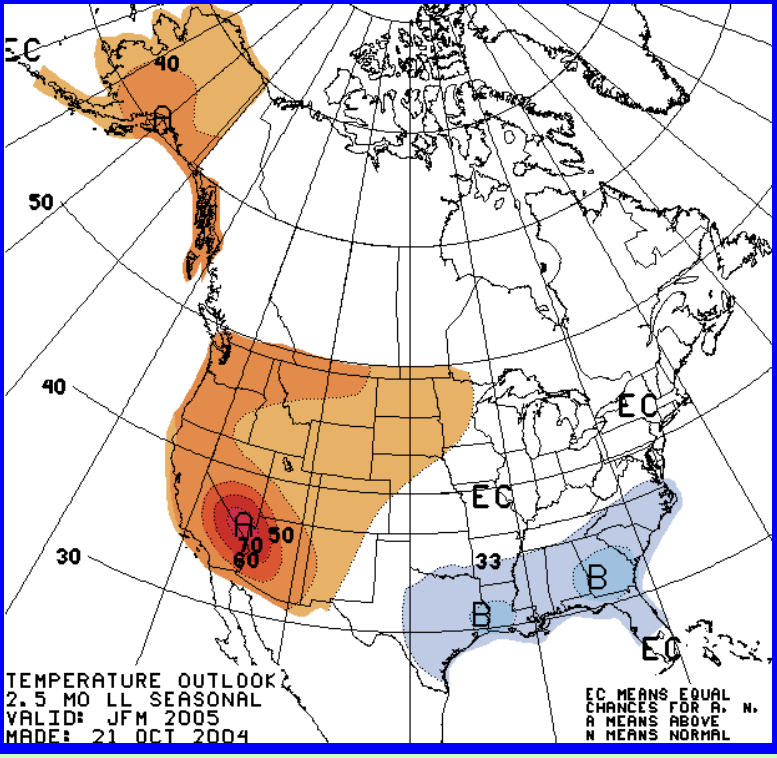


Outlooks combine long-term trends and soil-moisture effects, with typical ENSO cycle impacts, when appropriate.

U. S. Seasonal Outlooks January-March 2005

Temperature



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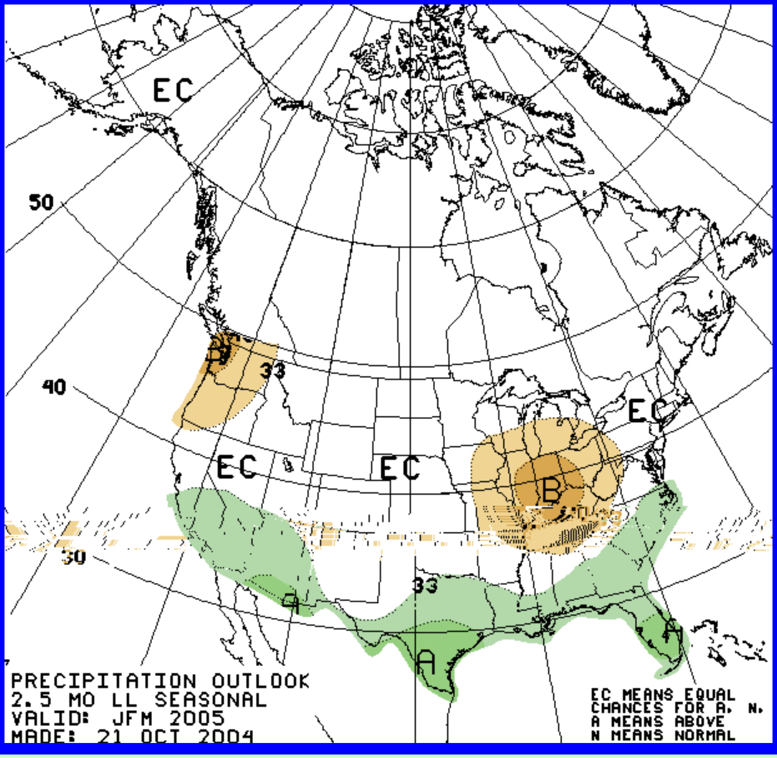


Outlooks combine long-term trends and soil-moisture effects, with typical ENSO cycle impacts, when appropriate.

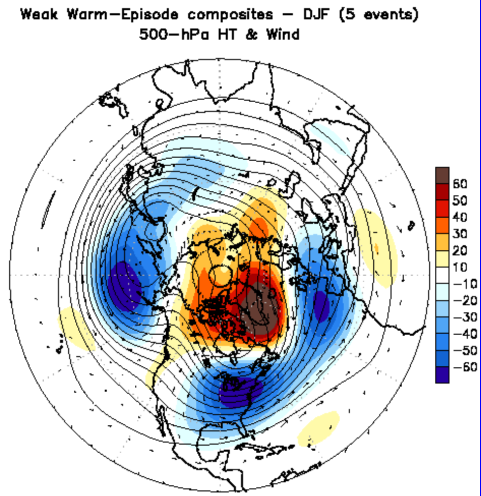
Behind the Forecasts

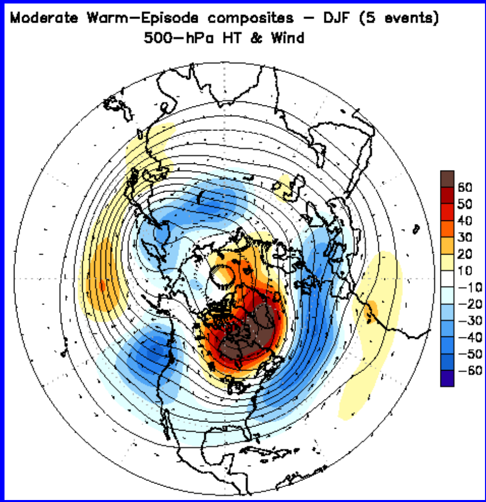
- Tools
  - Tropical Pacific SST forecasts (mid-Pacific, weak-to-moderate warm episode)
  - ENSO composites based on ONI

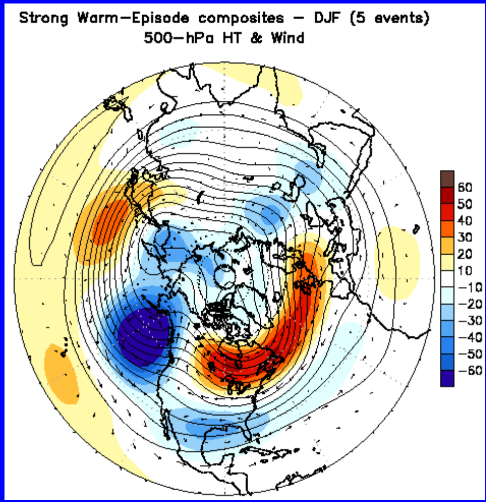
DJF Composite Patterns

	ONI +0.5 to +0.8	ONI +1.0 to +1.3	ONI +1.6 to +2.4

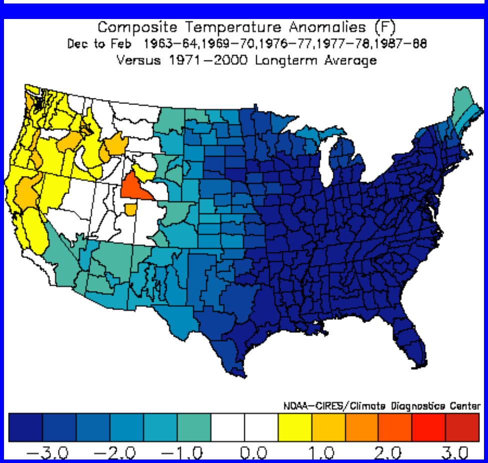
500-hPa

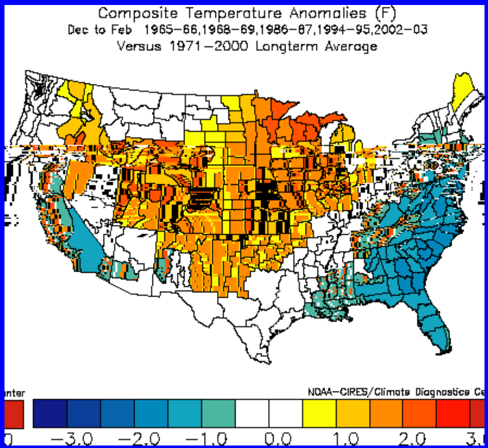


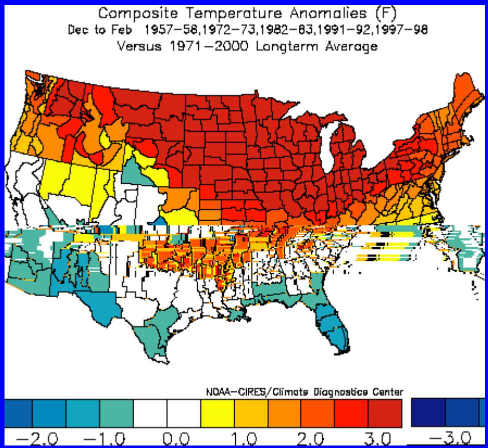




Temp.







Years: 63-64, 69-70, 76-77, 77-78, 87-88

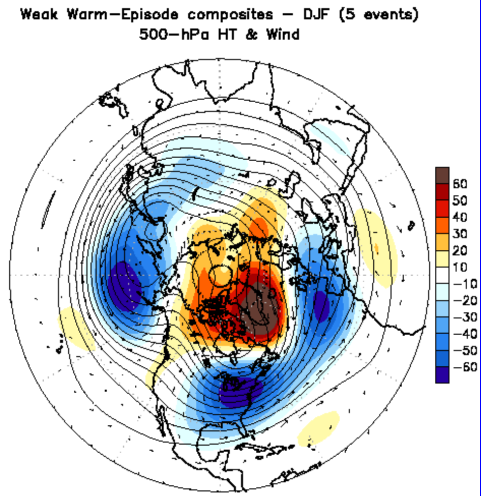
Years: 65-66, 68-69, 86-87, 94-95, 02-03

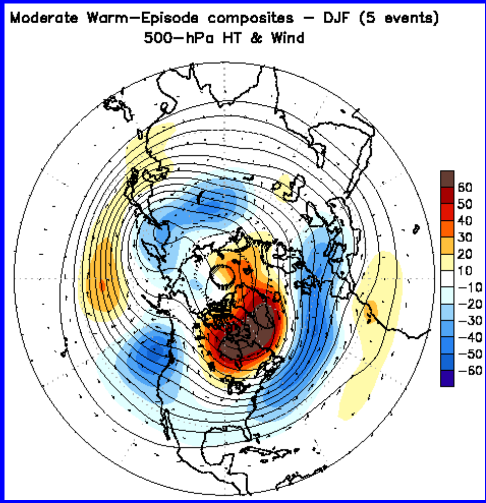
Years: 57-58, 72-73, 82-83, 91-92, 97-98

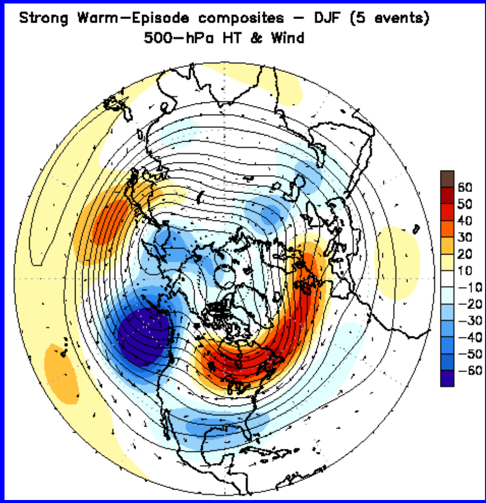
DJF Composite Patterns (cont.)

	ONI +0.5 to +0.8	ONI +1.0 to +1.3	ONI +1.6 to +2.4

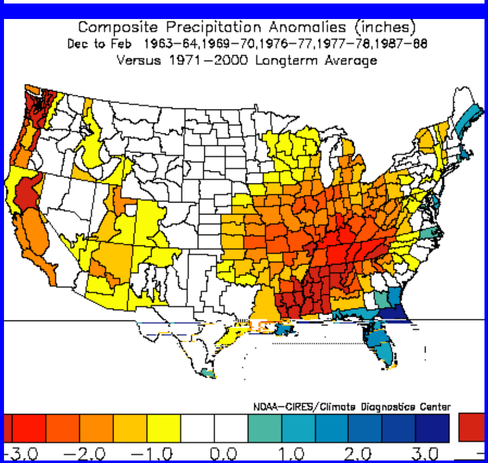
500-hPa

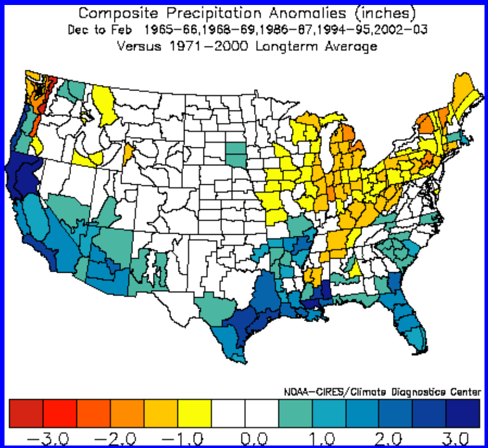


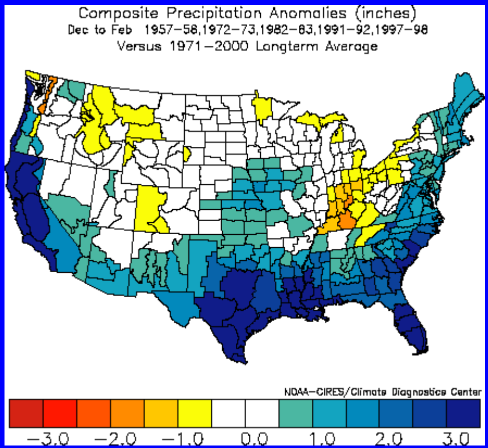




Precip.



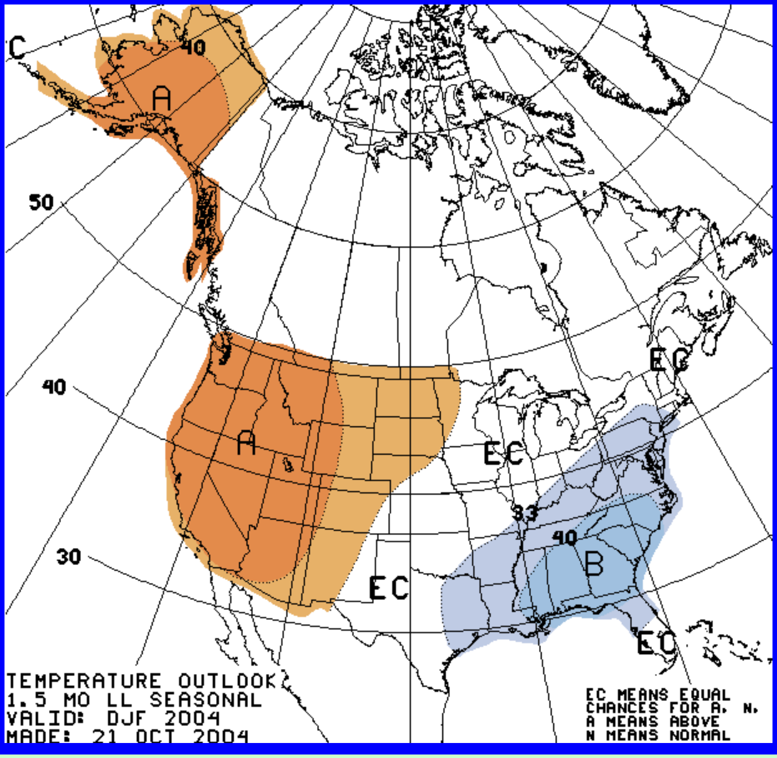




Years: 63-64, 69-70, 76-77, 77-78, 87-88	**Years: 65-66, 68-69, 86-87, 94-95, 02-03**	**Years: 57-58, 72-73, 82-83, 91-92, 97-98**

U. S. Seasonal Outlooks December 2004-February 2005

Temperature



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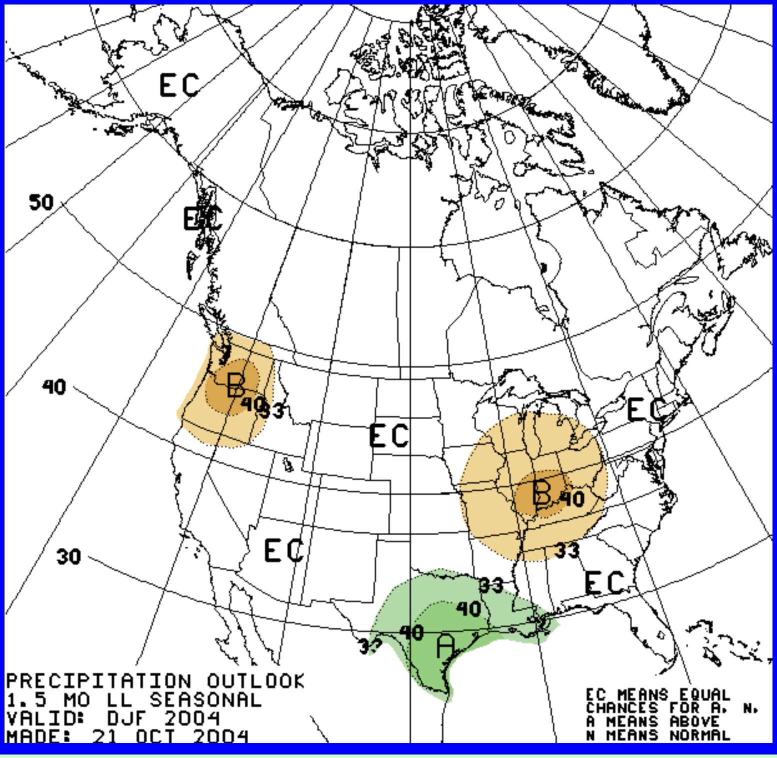

Outlooks combine long-term trends and soil-moisture effects, with typical ENSO cycle impacts, when appropriate.

Summary

• Persistent warmth in the central equatorial Pacific and recent expansion of this warmth into the eastern equatorial Pacific indicate that warm episode (El Niño) conditions have developed.

• The most recent value of the ONI is +0.9 (for the period August-October 2004), which satisfies the NOAA operational definition for El Niño. The most recent 5-month running mean value (June-October) of the Southern Oscillation Index (SOI) is –0.6, which is also consistent with the development of warm episode conditions.

• Based on statistical and coupled model forecasts and the recent evolution of oceanic and atmospheric conditions in the tropical Pacific, it seems most likely that SST anomalies in the Niño 3.4 region will remain positive, at or above +0.5°C, through early 2005.

• Expected impacts over the U. S. during this winter (DJF) include: wetter-than-average conditions over Texas, drier-than-average conditions over the Pacific Northwest and the Ohio and Tennessee Valleys, warmer-than-average conditions over most of the West, and over the northern and central Great Plains, and cooler-than-average conditions over the Gulf Coast, Southeast and Mid-Atlantic.